

Capital input measures at the OECD

Introduction

Two key measures of capital stock exist. The first is the *productive capital stock*, which looks at capital in its function as a provider of capital services in production. The second is gross (or net) capital stock, which captures the role of capital as a store of wealth (OECD, 2001; Schreyer, 2004; OECD, 2009). This section provides supplementary information on these two measures, on the approaches used to estimate them and on capital measures available at the OECD.

Definitions

Productive capital stock (and capital services)

When the purpose of capital measurement is to gauge its role in production and productivity, via capital services, it is necessary to construct measures of the *productive capital stock*. The productive capital stock per type of capital asset is constructed by applying an age-efficiency profile and a retirement pattern when past investments of each asset are summed up over time. For example, a 10-year old lorry would be given a lower weight compared with a new lorry when past purchases of lorries are added up to construct a measure of today's productive stock of lorries. Moreover, lorries are scrapped after a certain number of years and investments that date back by say 30 years would not enter today's productive stock. Unlike gross or net capital stock measures, aggregate measures of productive capital stock weigh different types of assets by their relative productivity using the *user costs* of each capital type. The resulting aggregate constitutes a measure for the potential flow of productive services that all fixed assets can deliver in production, i.e. capital services.

Net and gross (wealth) capital stocks

Perhaps the best known measure of capital stock is that used to value assets on a company, industry or nation's balance sheets, that is, the gross or net capital stock measures described in the System of National Accounts (SNA). These provide measures of wealth but they are not conceptually appropriate for productivity analysis. Unlike the productive capital stock, the purpose of wealth capital stocks measures is not to track the role of capital as a factor of production but to track the role of capital as a set of assets with market value – wealth capital stocks appear on the balance sheets in the SNA. This reflects the fact that the implicit weighting for the different assets used in building up wealth measures of total capital stock is based on the market prices of the different assets. However changes in the relative productivity of the different assets are not necessarily consistent with changes in the relative price of the assets. For productivity analysis it is the former measure (and weighting of different asset types) that is relevant.

Measuring capital input

In general, capital stock series are not directly measured. In common with most measures presented in the national accounts, they are estimated by national statistics institutes using available data on gross fixed capital formation (investment) with local methodology and assumptions – although there is increasing convergence towards international standards. There are heavy data requirements for the estimation of capital stocks which include the following:

- a benchmark level of capital stock for at least one year (preferably by asset type);
- a long-time-series of investment volumes and price deflators (preferably by asset type);
- as much asset type detail as possible;

- depending on the type of capital stock being estimated, estimates of average services lives by asset and/or depreciation rates for each asset;
- industry-by-asset-type investment matrices for capital stock by industry.

Capital measures in OECD statistics

Several OECD databases, described below, contain capital stock data. However some differences exist between them:

- *The origin of the data.* In some of the databases described below only official data made available to the OECD by national statistics institutes are used. In other databases however, particularly those that are considered more analytical databases, such as the *OECD Productivity Statistics* (database), other sources are often used to estimate missing data or to create estimates based on comparable estimation techniques.
- *The coverage of the data.* As shown in Table 7.3 below, some databases are confined to aggregate statistics, such as the *OECD Economic Outlook: Statistics and Projections* (database) or *OECD Productivity Statistics* (database). Others provide a break-down by industry, such as the *OECD Structural Analysis Statistics* (database) and the *OECD National Accounts Statistics* (database).
- *The capital stock variable.* The *OECD Productivity Statistics* (database) measures productive capital stocks (and therefore, capital services) whereas the *OECD Structural Analysis Statistics* (database) and *OECD National Accounts Statistics* (database) contain measures of net and/or gross (wealth) capital stocks.

Table 7.3. Asset and industry breakdown of capital stock data in OECD databases

		Asset breakdown	
		Yes	No
Industry breakdown	Yes	<i>OECD National Accounts Statistics</i> (database)	<i>OECD Structural Analysis Statistics</i> (database)
	No	<i>OECD Productivity Statistics</i> (database)	<i>OECD Economic Outlook: Statistics and Projections</i> (database)

StatLink  <http://dx.doi.org/10.1787/888933734740>

Capital services for the total economy, 8-way asset break down

Estimates of capital services in the *OECD Productivity Statistics* (database) are based on a common computation method for all countries (Schreyer et al., 2003). This approach estimates productive capital stocks for all countries on the assumption that the same service lives are applicable for any given asset irrespective of the country. In the *OECD Productivity Statistics* (database), the following average service lives are currently assumed for the different assets: 7 years for computer hardware, 15 years for telecommunications equipment, other machinery and equipment and weapons systems and transport equipment, 40 years for non-residential construction, 3 years for computer software and databases, 10 years for research and development and 7 years for other intellectual property products. The approach further uses harmonised deflators for computer hardware, telecommunications equipment and computer software and databases, for all countries, to sort out comparability problems that exist in national practices for deflation for this group of assets (Schreyer, 2002; Colecchia and Schreyer, 2002).

From 2015, the classification of assets adopted in the *OECD Productivity Statistics* (database) is in line with the 2008 SNA asset boundary. Productive capital stocks and the respective flows of capital

services are computed separately for eight non-residential fixed assets: computer hardware, telecommunications equipment, transport equipment, other machinery and equipment and weapons systems, non-residential construction, computer software and databases, research and development and other intellectual property products. By their very nature, capital services flows are presented as rates of change or indices and not as levels of stocks as is the case for measures of net and gross stocks. The aggregate volume of capital services (i.e. capital input) is then computed by aggregating the volume change of capital services of all individual assets applying asset specific *user cost* shares as weights. No conceptual distinction is made between user costs of capital and rental prices of capital. In principle, the rental price is that price that could be directly observed if markets existed for all capital services. In practice, however, rental prices have to be imputed for most assets, using the implicit rent that capital goods' owners 'pay' to themselves: the *user costs of capital*. In other words, the user cost of capital reflects the amount that the owner of a capital good would charge if they rented out the capital good under competitive conditions.

Net and gross capital stocks by broad economic activities, with 9-way asset break-down

The *OECD National Accounts Statistics* (database) brings together a large number of national accounts series for OECD and non-OECD countries. This includes data on net and gross capital stocks broken down by main economic activity and by nine types of assets: dwellings, other buildings and structures, transport equipment, other machinery and equipment and weapons systems, of which computer hardware and telecommunications equipment; cultivated biological resources; intellectual property products, of which computer software and databases and research and development. The data are transmitted by OECD member countries in reply to an official questionnaire and are provided in current prices and volumes. The level of industry detail and the time period covered varies across countries.

Net and gross capital stocks by detailed industries, no asset break-down

The *OECD Structural Analysis Statistics* (database) provides data on volume measures of *gross and net capital stock* by industry. The *OECD Structural Analysis Statistics* (database) covers all ISIC Rev.4 aggregations used for national accounts, some additional 2- and 3- digit ISIC Rev.4 detail, as well as specific aggregates. The level of industry detail and the time period covered varies across countries. A detailed overview of available data in the *OECD Structural Analysis Statistics* (database) can be found at <http://www.oecd.org/sti/ind/stanstructuralanalysisdatabase.htm>.

Alternative capital stocks, for the total economy, no asset break-down

The *OECD Economic Outlook* is a key twice-yearly publication with economic forecasts and analyses for OECD countries and key partner economies. One of the series available is the volume measure for non-residential capital services for the total economy (productive capital stocks).

How to access OECD capital input measures

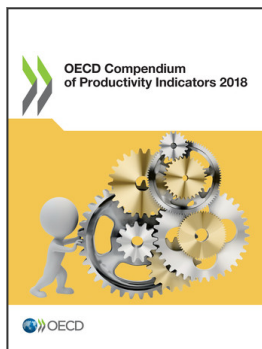
Aggregate capital services series in the *OECD Productivity Statistics* (database), along with methodological information and analytical papers and publications can be found on the *OECD Productivity Statistics* website on <http://www.oecd.org/std/productivity-stats/> or on the *OECD Productivity Statistics* (database) on OECD.Stat, within the theme Productivity, then selecting *Growth in GDP per capita, productivity and ULC*, and then *Growth in capital input*;

- Data on gross/net capital stocks by industry can be found in the *OECD Structural Analysis Statistics* (database) on: <http://www.oecd.org/sti/ind/stanstructuralanalysisdatabase.htm>;

- Gross/net capital stocks in the *OECD National Accounts Statistics* (database) can be found under the theme of the national accounts via: <http://stats.oecd.org/>, then selecting *Annual National Accounts; Main Aggregates; Detailed Tables and Simplified Accounts; Fixed Assets by Activity and by Type of Product*;
- Data used for the *OECD Economic Outlook*, such as the total economy productive capital stock volume series, are published separately and can be found under the item *Supply Block* through the current Economic Outlook theme on OECD.Stat (<http://stats.oecd.org/>).

Further reading

- OECD (2001), *Measuring Productivity - OECD Manual: Measurement of Aggregate and Industry-Level Productivity Growth*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264194519-en>.
- OECD (2009), *Measuring Capital - OECD Manual, Second edition*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264068476-en>.
- OECD (2010), *OECD Handbook on Deriving Capital Measures of Intellectual Property Products*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264079205-en>.
- Colecchia A. and P. Schreyer (2002), "The contribution of information and communication technologies to economic growth in nine OECD countries", *OECD Economic Studies*, Vol. 2002/1, http://dx.doi.org/10.1787/eco_studies-v2002-art5-en.
- Schreyer, P. (2002), *Computer Prices Indices and International Growth and Productivity Comparisons*, *Review of Income and Wealth*, Number 1, Series 48.
- Schreyer, P. (2004), "Capital Stocks, Capital Services and Multi-Factor Productivity Measures", *OECD Economic Studies*, Vol. 2003/2, http://dx.doi.org/10.1787/eco_studies-v2003-art11-en.
- Schreyer, P., P. Bignon and J. Dupont (2003), "OECD Capital Services Estimates: Methodology and a First Set of Results", *OECD Statistics Working Papers*, No. 2003/06, OECD Publishing, Paris, <http://dx.doi.org/10.1787/658687860232>.
- System of National Accounts (SNA) 2008, New York, <http://unstats.un.org/unsd/nationalaccount/sna2008.asp>



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